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Patent and Trademark Office

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/473,315	12/28/99	MOSLEY	L 884.209US1

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EXAMINER	
THOMAS, E	
ART UNIT	PAPER NUMBER
2831	

DATE MAILED: 08/13/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/473,315

Applicant(s)

MOSLEY, LARRY EUGENE

Examiner

Eric W Thomas

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 June 2001.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 8.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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Introduction:

The examiner acknowledges, as recommended in the M.P.E.P., the applicant's submission of the amendment dated 6/11/01. At this point claims 4, 6, & 9 have been amended; and claims 13-29 have been cancelled. Claims 1-12 are pending in the instant application.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 6-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6 line 8, the limitation "slightly greater than 7 microns" is confusing. It is not known what is meant by "slightly".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

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Claims 1, 4, and 5 are rejected under 35 U.S.C. 102(e) as being anticipated by Herrell et al. (US 6,191,479 B1).

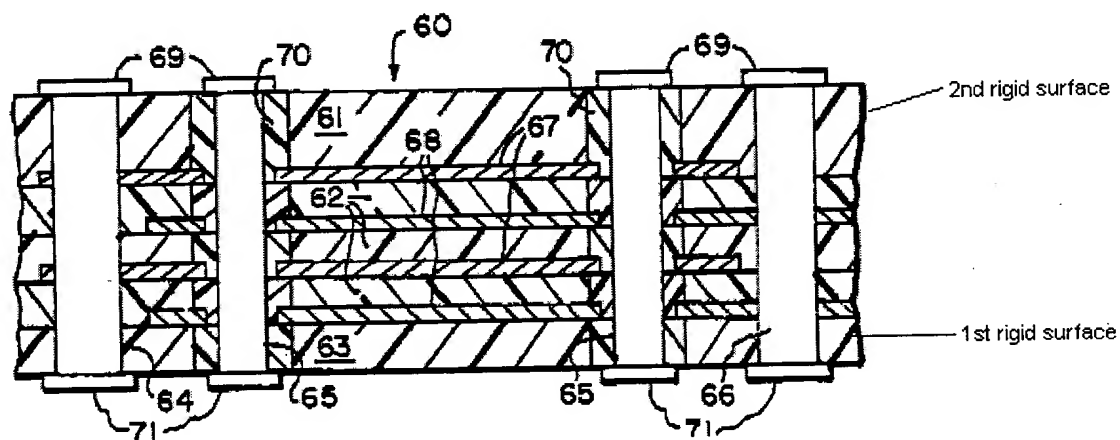
Regarding claim 1, Herrell et al. disclose in fig. 1, a plurality of conductive layers (13-14), embedded in a dielectric (12, 15, 18); and a plurality of vias (see fig. 3A-3B) coupling two conductive layers to a plurality of connection sites (16).

Regarding claim 4, the plurality of C4 connection sites have a pitch of 250 microns.

Regarding claim 5, the vias are plated through-holes.

Claims 9-10, are rejected under 35 U.S.C. 102(e) as being anticipated by Farooq et al. (US 6,072,690).

Regarding claim 9, Farooq et al. disclose in fig. 3 A, a multilayer capacitor having a pair of substantially rigid outer surfaces (see below), and a number of pads (69) located on two of the number of outer surfaces; wherein two of the number of pads are capable of being coupled to a substrate using a solder bump.



Regarding claim 10, the multilayer capacitor includes a number of parallel

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conductive layers and the number of pads are coupled to the number of parallel conductive layers through vias.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herrell et al. (US 6,191,479 B1).

Regarding claim 2, Herrell et al. disclose the claimed invention except for the thickness of the capacitor. It would have been an obvious matter of design choice to form the capacitor of Herrell having a thickness of between 0.5 mm to 1 mm, since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. *In re. Rose*, 105 USPQ 237 (CCPA 1955).

Regarding claim 3, Herrell et al. disclose the claimed invention, except for the capacitance being from 20 to 30 microfarads. It is well known in the capacitor art to form capacitors having a particular capacitance for an electrical system. It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the capacitor of Herrell et al. having a capacitance of 20 to 30 microfarads, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 6-8, & 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farooq et al. (US 6,072,690).

Regarding claim 6, Farooq et al. disclose (in fig. 3c) a plurality of first conductive layers (67), each of the plurality of first conductive layers formed on a first dielectric sheet (72); a plurality of second conductive layers, each of the plurality of second conductive layers formed on a second dielectric sheet (72), and the plurality of second conductive layers interlaced with the plurality of first conductive layers; a pair of dielectric sheets (see below) having a thickness, for providing a pair of substantially rigid outer surfaces for the plurality of second conductive layers interlaced with the plurality of first conductive layers, each of the pair of substantially rigid outer surfaces having a plurality of connection sites operable for coupling the capacitor to a substrate using a controlled collapse chop connection (C4); and a plurality of vias (64, 66) coupling the plurality of first conductive layers and the plurality of second plurality of second conductive layers to at least two of the plurality of connection sites.

Farooq et al. do not disclose the thickness of the pair of dielectric sheets having a thickness of slightly greater than 7 microns. It would have been an obvious matter of design choice to form the pair of dielectric sheets having a thickness of slightly greater than 7 microns, since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. *In re. Rose*, 105 USPQ 237 (CCPA 1955).

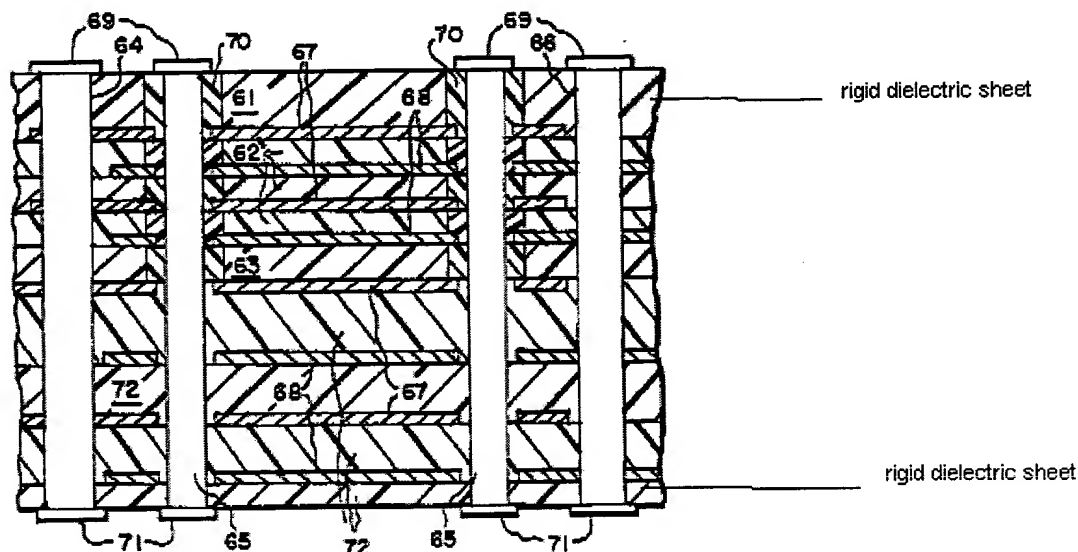


FIG. 3B

Regarding claim 7, Farooq et al. disclose the claimed invention except for the material used in the conductive layers. Tungsten paste is a well known material used as electrodes in the capacitor art. It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the conductive layers of Farooq et al. using tungsten paste, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Regarding claim 8, the number of surfaces is two.

Regarding claim 11, Farooq et al disclose the claimed invention except for the number of conductive layers is greater than about 50. The capacitor of Farooq et al. is not limited to the illustrated embodiments. It is well known in the capacitor art to use more than 50 electrode layers (conductive layers) to form a capacitor (in efforts to increase capacitance). It would have been obvious to one having ordinary skill in the art

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at the time the invention was made to form a capacitor having more than 50 layers of electrodes, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

Regarding claim 12, Farooq et al. disclose the claimed invention except for the number of pads is greater than about 4000. The capacitor of Farooq et al. is not limited to the illustrated embodiments. It is well known in the capacitor art to use more than 4000 connecting pads. It would have been obvious to one having ordinary skill in the art at the time the invention was made to form a capacitor having more than 4000 pads, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ

Response to Arguments

Applicant's arguments filed 6/11/01 have been fully considered but they are not persuasive.

-The argument (pg. 4 first paragraph), "that reference number "12" is not described in Harrell et al., so conductive layer 13 is not embedded in a dielectric. Thus, only conductive layer 14 is embedded in a dielectric, and therefore Harrell et al. does not disclose "a plurality of conductive layers embedded in a dielectric"" is not persuasive. Element 12 in fig. 1 is a dielectric (as noted by the cross-hatching). See MPEP 608.02. Therefore, Harrell et al. does anticipate claim 1.

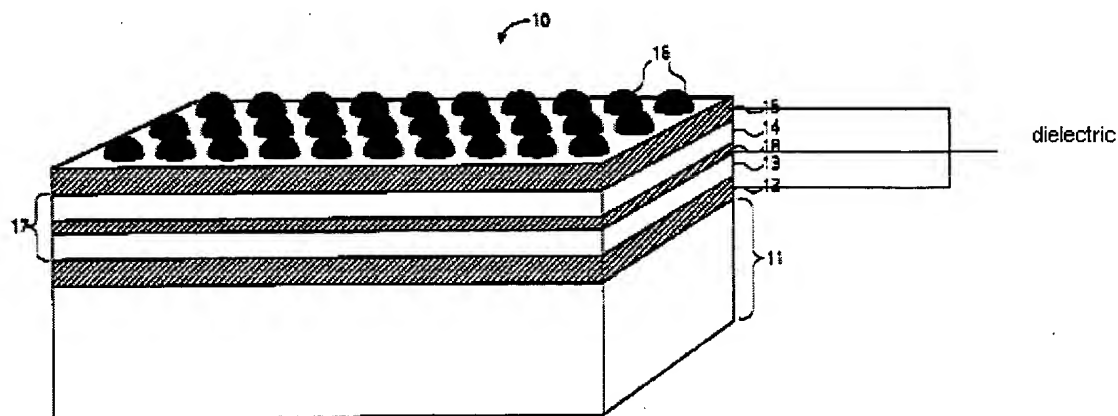


FIG. 1

--The argument (pg. 5 paragraph 2), applicant submits that Farooq et al. do not disclose "a plurality of substantially rigid outer surfaces". The reference does not use the term "rigid" is not persuasive. The outer surfaces of the capacitor of Farooq et al. are formed from a green sheet material that is fired. This sintered green sheet material inherently ^{is} ~~becomes~~ "rigid". Applicant is welcomed to submit an affidavit or declaration ^{as of 10/02} under 37 CFR 1.131 stating that the process of forming the outer surface of the capacitor of Farooq et al. does not form a rigid layer.

--The argument (pg. 5-6, paragraph 6, 1), "applicant submits that since all the elements of the rejected claim are not found in Herrell et al. and since the Office Action does not cite another reference that discloses all the elements of claim 2, applicant assumes that the rejection is based on facts within personal knowledge of the Examiner" is not persuasive. Applicant is reminded that the rejection was based on case law (*In re. Rose*, 105 USPQ 237 (CCPA 1955) "A change in size is generally

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recognized as being within the level of ordinary skill in the art".) not on "personal knowledge of the examiner".

--The argument (pg. 6 paragraph 2), "applicant submits that in the art of forming capacitors, forming capacitors that have a plurality of conductive layers coupled to a plurality of connection sites forming a capacitor that has a thickness of between 0.5 mm and 1 mm and that has a capacitance of 20 to 30 microfarads is not a matter of obvious design choice. The complex combination of capacitance value, thickness and a plurality of conductive layers coupled to a plurality of connection sites differs significantly from the prior art" is not persuasive. Forming capacitors having a particular capacitance is well known in the art. This is accomplished by using certain dielectrics (i.e. dielectrics having a high dielectric constants (PZT)); forming large surface area electrodes; and the separation of the plurality of plates. Applicant is reminded that capacitance is determined by the following formula:

$$C = \kappa \epsilon_0 A/d$$

κ – dielectric constant d – distance between electrodes (directly proportional to
 A – Area of the electrode the thickness of the capacitor).

**see attachment SERWAY PHYSICS FOR SCIENTISTS & ENGINEERS 3rd
Edition pg. 721

Applicant's arguments with respect to claims 6-8 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric W Thomas whose telephone number is (703) 305-0878. The examiner can normally be reached on Mon-Thur & alternating Friday 6:00-3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dean Reichard can be reached on 703-308-3682. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3432 for regular communications and (703) 305-1341 for After Final communications.

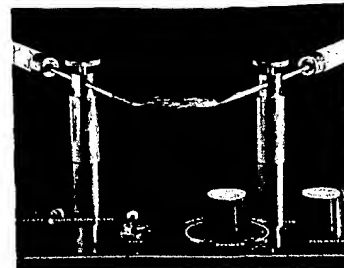
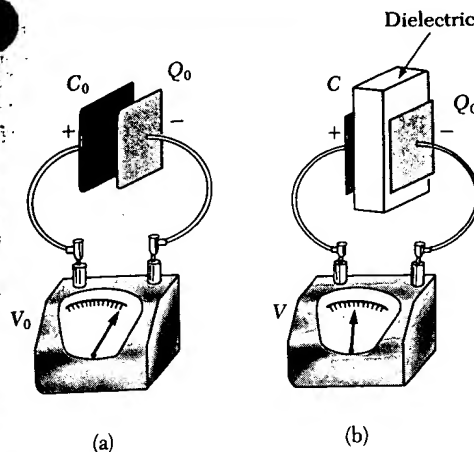
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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

ewt

August 10, 2001

Dean A. Buchholz 8/10/01
Dean A. Buchholz
8/10/01



This photograph illustrates dielectric breakdown in air. Sparks are produced when a large alternating voltage is applied across the electrodes using a high-voltage induction coil power supply. (Courtesy of CENCO)

When a dielectric is inserted between the plates of a charged capacitor, the charge remains unchanged, but the potential difference as recorded by an electrostatic voltmeter is reduced from V_0 to $V = V_0/\kappa$. Thus, the capacitance *increases* in the process by the

factor κ . (The capacitor circuit is *open*, that is, the plates of the capacitor are *not* connected to a battery and charge cannot flow through an ideal voltmeter. We discuss the voltmeter further in Chapter 28.) Hence, there is *no* path for charge to flow and alter the charge on the capacitor. If a dielectric is inserted between the plates as in Figure 26.11b, it is found that the voltmeter reading *decreases* by a factor κ to a value V , where

$$V = \frac{V_0}{\kappa}$$

Since $V_0 = Q_0/C_0$, we see that $\kappa > 1$.

Since the charge Q_0 on the capacitor *does not change*, we conclude that the capacitance must change to the value

$$C = \frac{Q_0}{V} = \frac{Q_0}{V_0/\kappa} = \kappa \frac{Q_0}{V_0}$$

$$C = \kappa C_0 \quad (26.15)$$

is the capacitance in the absence of the dielectric. That is, the capacitance *increases* by the factor κ when the dielectric completely fills the space between the plates.³ For a parallel-plate capacitor, where $C_0 = \epsilon_0 A/d$, we express the capacitance when the capacitor is filled with a dielectric as

$$C = \kappa \frac{\epsilon_0 A}{d} \quad (26.16)$$

From Equations 26.3 and 26.16, it would appear that the capacitance can be made very large by decreasing d , the distance between the plates. In

an experiment is performed in which the dielectric is introduced while the potential difference remains constant by means of a battery, the charge increases to a value $Q = \kappa Q_0$. The voltage is supplied by the battery and the capacitance still increases by the factor κ .

The capacitance of a filled capacitor is greater than that of an empty one by a factor κ .